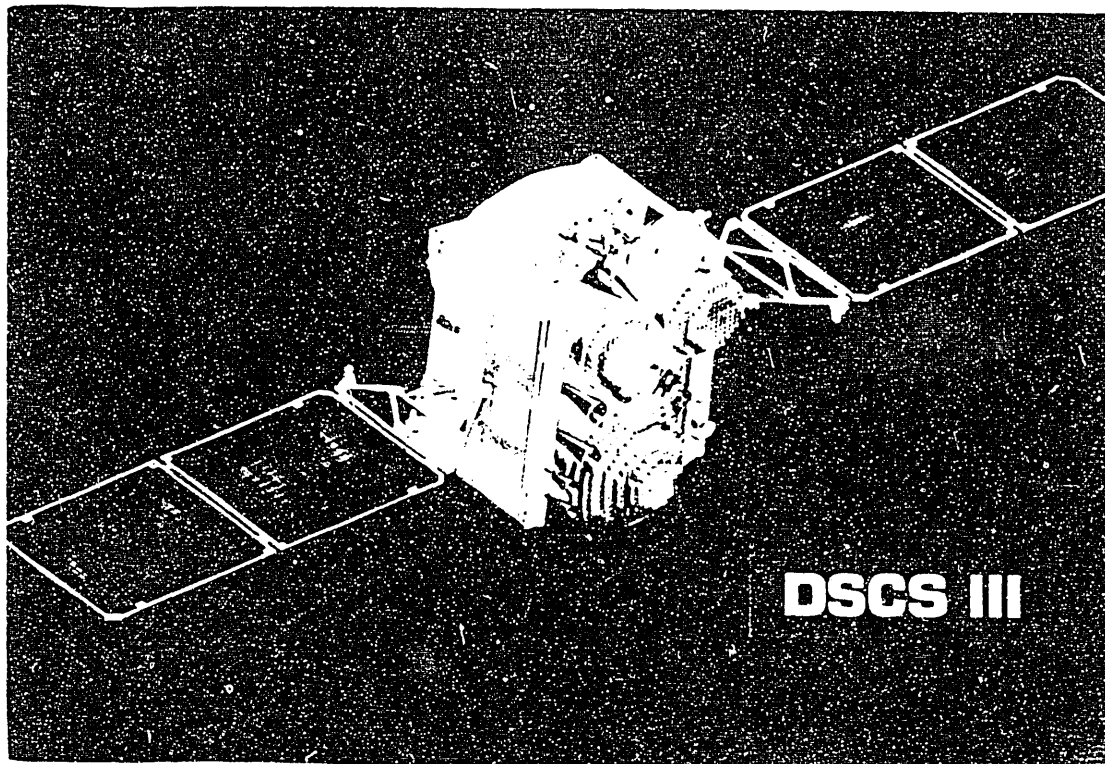




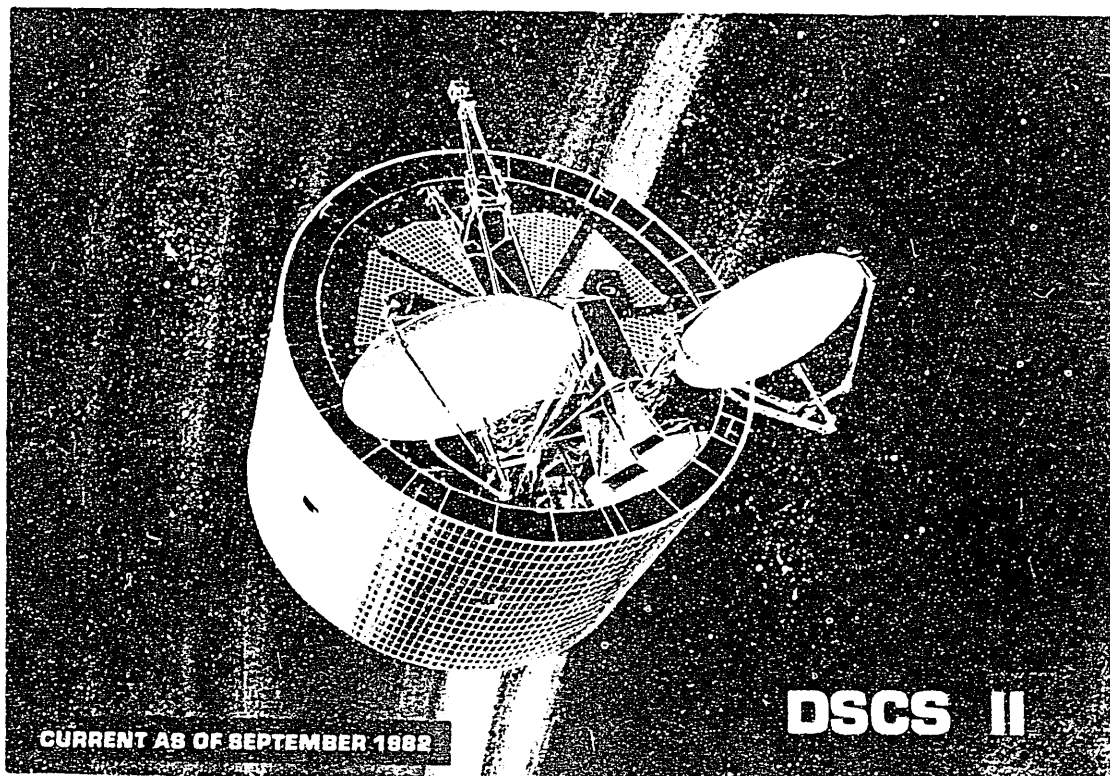
# United States Air Force

OFFICE OF PUBLIC AFFAIRS, AIR FORCE SYSTEMS COMMAND, ANDREWS AFB, MD 20334, (301) 981-4137



**DSCS III**

## DEFENSE SATELLITE COMMUNICATIONS SYSTEM



**DSCS II**

CURRENT AS OF SEPTEMBER 1982

The Defense Satellite Communications System (DSCS) is a worldwide satellite communications program sponsored by the Department of Defense.

In Phase I, 26 small communications satellites, weighing approximately 100 lb. (45 kg) each and measuring 36 inches (92 cm) in diameter, were launched between June 1966 and June 1968. In this Initial Defense Communications Satellite Program (IDCSP), each satellite relayed voice, imagery, computerized digital data, and teletype transmissions.

Even though these early satellites were designed to last 18 months, one of the 26 is still operating eleven years after launch.

The IDCSP has since been replaced by DSCS Phase II. The DSCS II satellites carry many times the communications load of IDCSP with substantial increases in transmission strength and doubled lifetime expectancy. The DSCS II operational system consists of four active satellites and two spares orbiting the earth.

Phase II satellites contain propulsion systems for orbit repositioning to support contingency operations.

The two dish-shaped antennas on DSCS II are steerable by ground command. The antennas can concentrate their electronic beams on small areas of the earth's surface for intensified coverage to link small, portable ground stations into the communication system.

In Phase III now under development, new longer-lasting more powerful DSCS satellites will be operational in the 1980s. Phase III satellites will be designed to last twice as long as DSCS II with six active communications transmitters instead of two.

Antenna design for DSCS III allows the user to switch between fixed earth-coverage antennas and multiple beam antennas. The latter will provide an earth coverage beam as well as electrically steerable area and narrow-coverage beams. In addition, a steerable transmit dish antenna will provide a spot beam with increased radiation power for users with small receivers. In this way the communications beams are tailored to suit the needs of different size user terminals almost anywhere on the surface of the earth.

Presently, the communications capabilities and positioning of DSCS II satellites are centrally controlled from the Air Force Satellite Test Center at Sunnyvale, CA, through a worldwide network of Satellite Control Facility stations. The DSCS III system will be designed so that selected Defense Communications Agency (DCA) managed Satellite Configuration Control Elements (SCCE) will also have the ability to control both the satellite's communications capabilities and its position. The current operating plan for DSCS III is for the SCCE to assume the primary role in controlling the Satellite Communications Systems with the AFSCF continuing, as in DSCS II, to perform the function of controlling the other satellite systems and maintaining the proper satellite orbit. This will increase the flexibility of DSCS by providing a more direct response to communications system user requirements and by providing DSCS III with backup capability for the Satellite Test Center, should it ever be needed.

The first two DSCS IIIs scheduled for launch in 1982 and 1983, are called demonstration flight satellites and will be used as prototypes to test the new satellite design. The qualification satellite is planned for refurbishment for a 1984 launch. Up to 12 production satellites are planned to be acquired to ensure continuity of DSCS service through the mid-1990's

SIZE: (metric figures are approximate)

Phase I - 3 ft.(.92 m) in diameter, 2 ft. 8 in.(.8 m) high

Phase II - 9 ft.(2.74 m) in diameter, 13 ft.(4 m) high

Phase III - 8 ft. 10 in.(2.7 m) in diameter, 6 ft. 8 in.(2 m) high

WEIGHT

Phase I - 100 lb.(45.4 kg) (dry only)

Phase II - 1,181 lb.(536 kg) (dry); 1,365 lb.(619 kg) (wet)

Phase III - 1,876 lb.(853 kg) (dry); 2,476 lb.(1,125 kg) (wet)

ORBIT:

Phase I - 20,930 stat. mi.(33,500 km); equatorial

Phase II and III - 23,230 stat. mi.(37,000 km); synchronous, equatorial

STABILIZATION:

Phase I - Spin stabilized at 150 rpm

Phase II - Spin stabilized at 60 rpm

Phase III - Three-axis stabilized

ANTENNAS:

Phase I - Circularly polarized torroidal

Phase II - Two earth-coverage horn antennas (one transmit, one receive) and two steerable spot-beam, dish antennas (one of which is defocused to provide an area-coverage beam). An omnidirectional biconical horn is used for command and control.

Phase III - Electronically steerable, multiple beam antennas are used for earth-coverage, area-coverage, and spot beams. The two multiple beam transmit antennas will each have 19 elements (beams). The receive antenna will have 61 beams with the capability of producing steerable nulls in the earth-coverage mode to counteract jamming. Two transmit and two receive earth-coverage horn antennas will provide additional communications support. A high-gain narrow-coverage, steerable dish antenna will provide a beam of increased radiated power for users with small receivers. A cross-dipole transmit antenna and a flat-back cavity spiral receive antenna are included on the DSCS III satellite as a part of the Air Force Satellite Communications (AFSATCOM) Program link with strategic alert forces. Two transmit/receive turn-style antennas are used for command and telemetry.

EFFECTIVE ISOTROPIC RADIATED POWER (EIRP):

Phase I - 7 dbw

Phase II - Earth coverage is 28 dbw

Area coverage is 31.5 dbw (one antenna transmitting).

Narrow coverage is 43 dbw (one antenna transmitting).

Phase III - Each earth-coverage horn antenna radiates 25 dbw.

Each multibeam antenna provides earth, area, and narrow-coverage beams and is used with 10 and 40-watt traveling wave tube amplifiers (TWTAs) to provide a range of EIRPs from 23-40 dbw.

Narrow-coverage, steerable dish antenna provides an EIRP of 44 dbw with a 40-watt TWTAs.

Turn-style antenna provides 0 dbw.

#### FREQUENCIES:

	<u>Receive</u>	<u>Telemetry Tracking Transmit</u>	<u>Command</u>
DCSP	8.0 GHz <sub>z</sub>	7.3 GHz <sub>z</sub>	400 MHz <sub>z</sub>
		(Telemetry only)	
DSCS II	7.9 to 8.4 GHz <sub>z</sub>	7.25 to 7.75 GHz <sub>z</sub>	S-Band
DSCS III	7.9 to 8.4 GHz <sub>z</sub>	7.25 to 7.75 GHz <sub>z</sub>	S-Band and SHF

#### CHANNELS AVAILABLE:

Phase I - 1

Phase II - 4

Phase III - 6

#### DESIGN LIFE:

Phase I - 3 years

Phase II - 5 years

Phase III - 10 years

LAUNCH VEHICLE: All DSCS satellites can be launched by the Air Force Titan III launch vehicle. A maximum of eight Phase I satellites were launched at one time on the Titan IIIC. One DSCS II and one DSCS III spacecraft can be launched at a time on the Titan 34D/Inertial Upper Stage or Titan/Transtage. The DSCS III will also be designed for on-orbit delivery by the Space Shuttle. First launch of two DSCS III satellites on the Shuttle is scheduled for 1985.

RESPONSIBLE AGENCY: The Defense Communications Agency (DCA) manages the Defense Satellite Communications System.

PROGRAM MANAGER: The Air Force Space Division (SD), of the Air Force Systems Command, Los Angeles Air Force Station, CA, manages the design, development, production and launch of DSCS spacecraft.

CONTRACTORS:

Ford Aerospace and Communications Corp. (formerly Philco-Ford Corp.) manufactured the IDCSP satellites;

TRW Systems Group, Redondo Beach, CA, manufactures the DSCS II satellites;

General Electric, Space Division, Philadelphia, PA, manufactures DSCS III satellites;

The Aerospace Corporation, El Segundo, CA, is providing general systems engineering and technical integration support under contract to SD.

PROGRAM STATUS: Ten years after launch of Phase I, one IDCSP satellite is still operating.

A total of 16 DSCS II satellites have been procured:

- The first two DSCS II spacecraft, launched Nov. 2, 1971, no longer operate.
- Of the second two, launched Dec. 13, 1973, one is still operating over the Indian Ocean.
- The third pair did not achieve orbit because of a failure in the Titan III guidance system, May 20, 1975.

A second set of six DSCS II satellites was ordered from TRW in Oct. 1974 for launch between 1977 and 1979:

- The first two of this set were launched May 12, 1977 and are providing operational communications.
- The second two satellites were launched March 25, 1978, but did not achieve orbit because of a failure in the Titan III booster second stage.
- Two DSCS II satellites were put in orbit December 13, 1978. The spacecraft were stationed over the Pacific Ocean at the equator. These satellites completed the DSCS world-wide network of four active satellites.

In fiscal year 1977, four additional DSCS II satellites were procured for launch in 1979 and the early 1980s; these satellites will have double Effective Isotropic Radiated Power(EIRP) through the use of 40-watt TWTAs in place of 20-watt TWTAs used in the first 12 DSCS II satellites.

- In November 1979, two more DSCS II satellites were launched from Cape Canaveral and placed in geosynchronous orbit, one over the Atlantic, the other over the Indian Ocean. With this launch a full complement of four active and two on-orbit spare satellites was achieved.

The DSCS III full scale engineering development phase is concluding with the launch of the first DSCS III, along with a DSCS II in late 1982. The DSCS III program has begun its production phase with the award of the production contract in January 1982 for two of 12 production satellites.

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